TIMKEN®

THE TIMKEN COMPANY
GENERAL OFFICES
CANTON, OHIO, U.S.A. 44706
TELEPHONE: (216) 438-3000

February 1, 1985

Mr. Douglas C. Hasbrouck
District Chief
Ohio Environmental Protection Agency
Northeast District Office
2110 East Aurora Road
Twinsburg, OH 44087

Dear Mr. Hasbrouck:

Pursuant to your letter of November 19, 1984, enclosed please find The Timken Company's application for a National Pollution Discharge Elimination System (NPDES) permit for our neutralized pickle liquor surface impoundments at our Canton-Gambrinus facility. Please note as per this application the Company is proposing to undertake a hydrogeological study as outlined in our application.

As you noted in your letter, some time will be involved in designing and executing this study. We have just received the enclosed report from our environmental consultant, who is R. J. Schoenberger, Ph.D., P.E. of Weston. While we have begun action to initiate the study, further discussion will be required to work out the details of the study and the time schedule for the same. We will send you a copy of the study proposal after it is finalized. In the meantime, if you have any questions, please contact me.

Sincerely,

William A. Fladung

William A. Fladung
Manager - Environmental Control

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Enclosures

APPLICATION TO THE
OHIO ENVIRONMENTAL PROTECTION AGENCY
FOR
WASTE WATER DISCHARGE PERMITS
TO
THE GROUND WATER AND AN UNNAMED
TRIBUTARY TO HURFORD RUN
STARK COUNTY, OHIO

Date: January 31, 1985

SUBMITTED BY

THE TIMKEN COMPANY
1835 Dueber Avenue, S. W.
Canton, OH 44706

WASTE WATER DISCHARGE PERMITS
UNDER THE
NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM
FROM
SURFACE IMPOUNDMENTS RECEIVING LIME
STABILIZED PICKLE LIQUOR

The Timken Company, as part of its manufacture and production of steel products, routinely acid treats the metal surfaces with high strength pickle liquors. Spent pickle liquor is neutralized with lime and discharged to surface impoundments. Currently one impoundment, designated as No. 3, is still in use, while Impoundments No. 1 and 2 have been closed and capped.

The lime neutralization facility is permitted by the State of Ohio under permit No. 02-76-0588 to treat 180,000 gpd of spent sulfuric pickle liquor. For this application, the requested discharge quantity is also 180,000 gpd although recent Company history indicates that the actual discharge (current) is less than that amount. Assuming that business will continue to expand to pre-1980 levels and greater, the full discharge capacity will be required.

PLANT LOCATION

The point of discharge from the waste water lagoons is shown in Figure 1. Also shown in Figure 1 is the location of the two closed ponds which were previously used for disposal of lime neutralized sludge.

POND CONSTRUCTION

Construction of the ponds was completed in phases as requirements for sludge disposal expanded. Ponds No. 1 and 2 were constructed from native soil with excavation of the pond area to achieve a uniform flat bottom. Excavated soil, supplemented with slag material, was used for construction of berms or side wall containment areas. In the construction of Pond No. 3, side wall containment dikes composed of slag were erected on the ground surface to form a perimeter of sufficient height to contain a volume level with Ponds No. 1 and 2 (no excavation). The ponds are not lined and details of the bottom construction are only known from subsurface soil investigations in the zone surrounding the ponds.

HYDROGEOLOGICAL INVESTIGATIONS

A hydrogeological investigation was completed by the consulting firm of Dames and Moore as summarized in a report dated March 12, 1981. In that report, conditions of subsurface soils and geological strata are defined. Six permanent ground water monitoring wells were installed during the course of that study. The location of these wells are also shown in Figure 1 and are designated as Wells No. 7 through 12. In addition, an existing piezometer known as Well No. 1 was constructed previously and was still useable as a piezometer and ground water monitoring point.

The geological cross section is shown in Figure 2. A second cross section is shown in Figure 3. The results of the drilling program indicated that subsurface conditions beneath the pond is largely clay, sand and gravel having aquifer coefficients as given in Table 1. It can be seen from the transmissivity and the permeability that the aquifer beneath the pond is a good yielding source of water. The adequacy of this ground water yield is verified by the fact that production Wells No. 15 and 17 provided water to Timken for process use prior to the installation of the Company's water treatment plant and associated recirculation system. These three production wells are approximately 90 feet deep and have a minimum yield of 1,400 gpm. All three wells were drilled in 1950 or in years prior to that date. It is known that these wells are screened for a length of approximately 50 feet into the glacial till.

Upon installation of the monitoring wells, readings were taken from the six new wells and the existing piezometer designated as Well No. 1. Results of those water elevations are shown in Table 2. It can be seen from the plotting of the ground water depths that elevations of ground water are more than 20 feet from the land surface for all wells except No. 11 and 12. The water elevations for No. 11 and 12 are slightly less than 10 feet from ground surface. By plotting the elevations measured in ground water monitoring wells, the contours of the piezometric surface are shown in Figure 4. These piezometric contours indicate general flow directions to the north with a secondary flow direction to the northwest. This direction of ground water flow is in the drift aquifer shown in Figure 5. That aquifer increases to the south and to the southeast and southwest from a bedrock knoll lying north of the closed ponds and south of the existing railroad siding. Those details are shown in Figure 5.

COMPOSITION OF SLUDGE

Table 3 lists the results of three samples for raw slurry and one sample of the decant. The decant composition is the chemical analyses of water which is discharged to the ground water and surface water in accordance with this permit application. It can be seen that the decant has elevated concentrations of sulfate, total dissolved solids and total hardness. While the concentration of most metals is about background, there are no concentrations of metals which exceed drinking water standards except for iron. Discharges from the stablized liquor pond may be either to the surface water or to the ground water. Most of the discharge is vertically to the ground water. During periods of high rainfall, the free-standing water may move laterally to the surface water.

An analysis of the sludge was performed to determine its characteristics for leaching materials according to the RCRA EP toxicity testing procedure. Results of those tests are given in Table 4. Since this material was leached under acid conditions, the solubility of inorganic constituents is greatly enhanced compared to the original material and decant. Therefore, the results of both cation and anoin parameters are elevated as expected in the low pH extract. Comparison of the pH in Table 4 with the actual pH of the material as given in Table 3, indicates that there is sufficient alkalinity to maintain the pH of the sludge well above that used in the EP toxicity test.

QUALITY OF DISCHARGE

The request for discharge to the subsurface and to the unnamed tributary of Hurford Run is given by the Decant column in Table 3. This is the expected discharge concentration before mixing rainwater with the stabilized sludge in the lagoons. The quality of discharge from rainwater leaching through the inplace stabilized sludge is given in Table 4, as listed in the four samples under pond 3. Results of those leaching tests would indicate an elevated concentration of sulfate, total dissolved solids and iron.

Since the discharge to the unnamed tributary of Hurford Run only occurs when water elevations in the lagoon are high, the ratio of subsurface to surface discharge is assumed to be 2 to 1. Therefore, the permit discharge request is for 60,000 gpd to the surface stream and 120,000 gpd to ground water.

FUTURE MONITORING PROGRAM

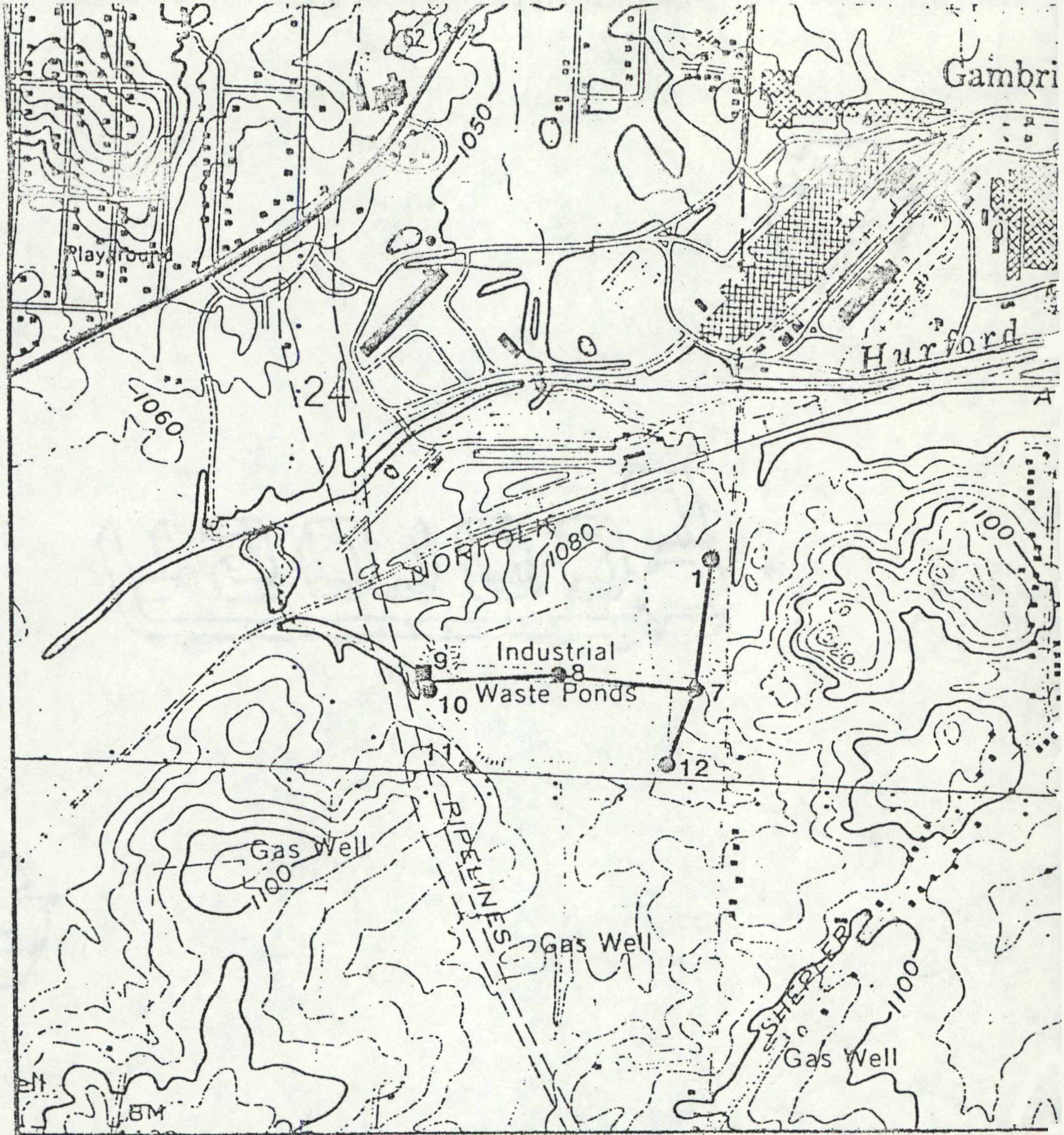
A determination of the impact of the lagoon discharge on receiving ground water quality cannot be made until more information is gathered with respect to subsurface flow. Currently, there are no downgradient monitoring wells from which the water quality impact can be measured. To address the unknowns associated with this application, Timken proposes implementation of the following program.

1. Prepare a plan for subsurface hydrogeological study. This plan is to be submitted to Ohio EPA for approval.

2. Complete the hydrogeological study and determine the impacts of infiltration on ground water quality.

3. Analyze the ground and surface water quality for Primary and Secondary drinking water criteria and Priority Pollutant parameters as specified in the Iron and Steel Categorical Discharge limits.

4. Update the NPDES application and make appropriate recommendations for monitoring.



LEGEND:

10 SHALLOW MONITOR WELL

9 DEEP MONITOR WELL

SUBSURFACE CROSS SECTION

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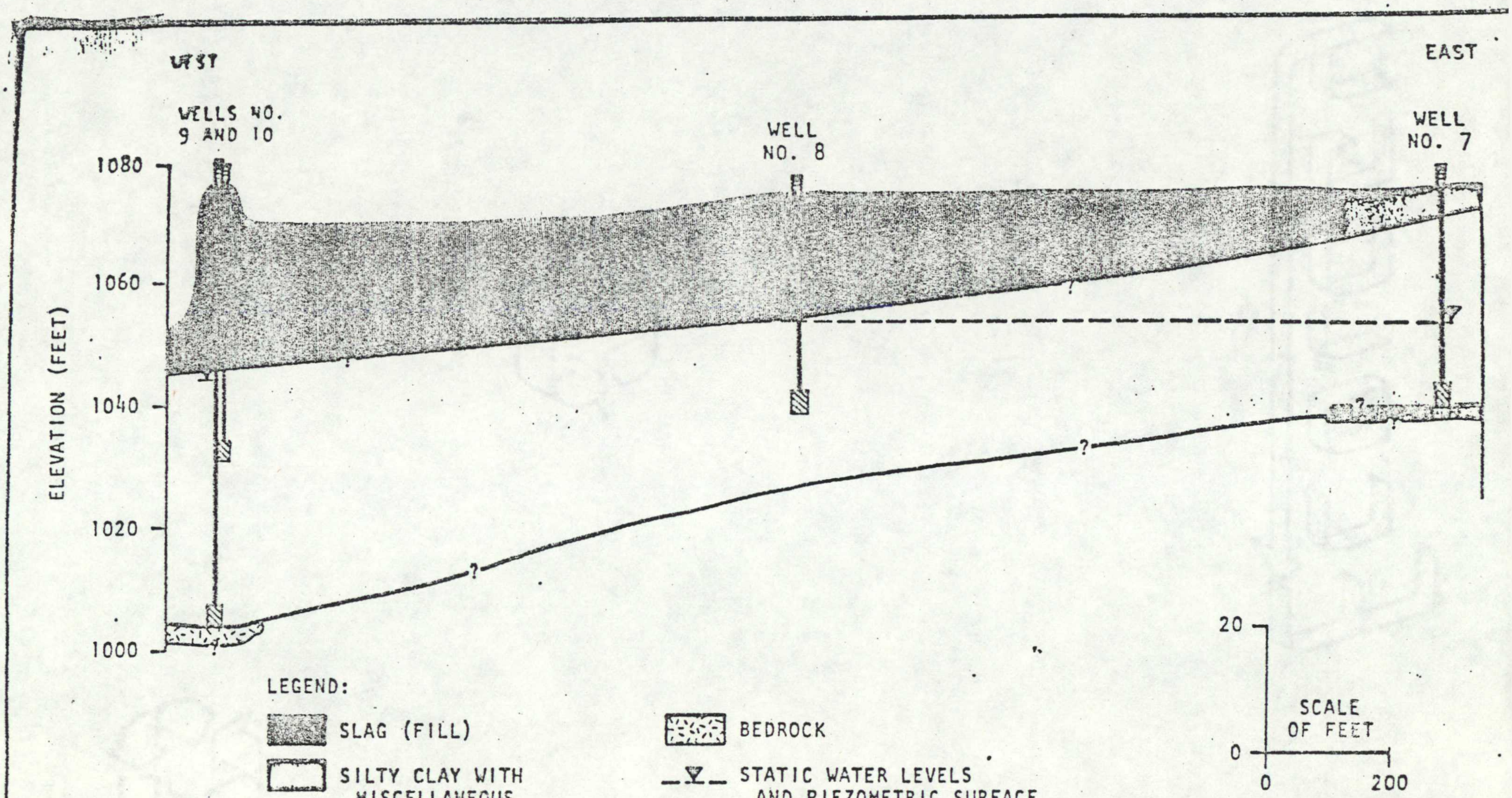
FIGURE 1

PLOT PLAN
GROUNDWATER
MONITOR WELLS

DAMES & MOORE JOB NO. 2682-009 MARCH 198



LEGEND:

- SLAG (FILL)
- SILTY CLAY WITH MISCELLANEOUS CONTENT (FILL)
- CLAYEY SAND AND GRAVEL
- GRAY SILTY CLAY (TILL)
- BEDROCK
- STATIC WATER LEVELS AND PIEZOMETRIC SURFACE ON FEBRUARY 5, 1980
- 3 FOOT WELL SCREEN
- WELL CASING STICKUP

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FIGURE 2

GENERALIZED EAST-WEST CROSS SECTION THROUGH WELLS NO. 9 AND 10, 8 AND 7

THE ACCURACY OF THE DEPTH AND THICKNESS OF SOIL AND ROCK STRATA IS DEPENDENT ON BORING INFORMATION MADE AVAILABLE TO [illegible] AND [illegible]. IT IS POSSIBLE THAT ACTUAL CONDITIONS MAY VARY FROM THOSE INDICATED AT THE BORING LOCATIONS OR AS INTER-

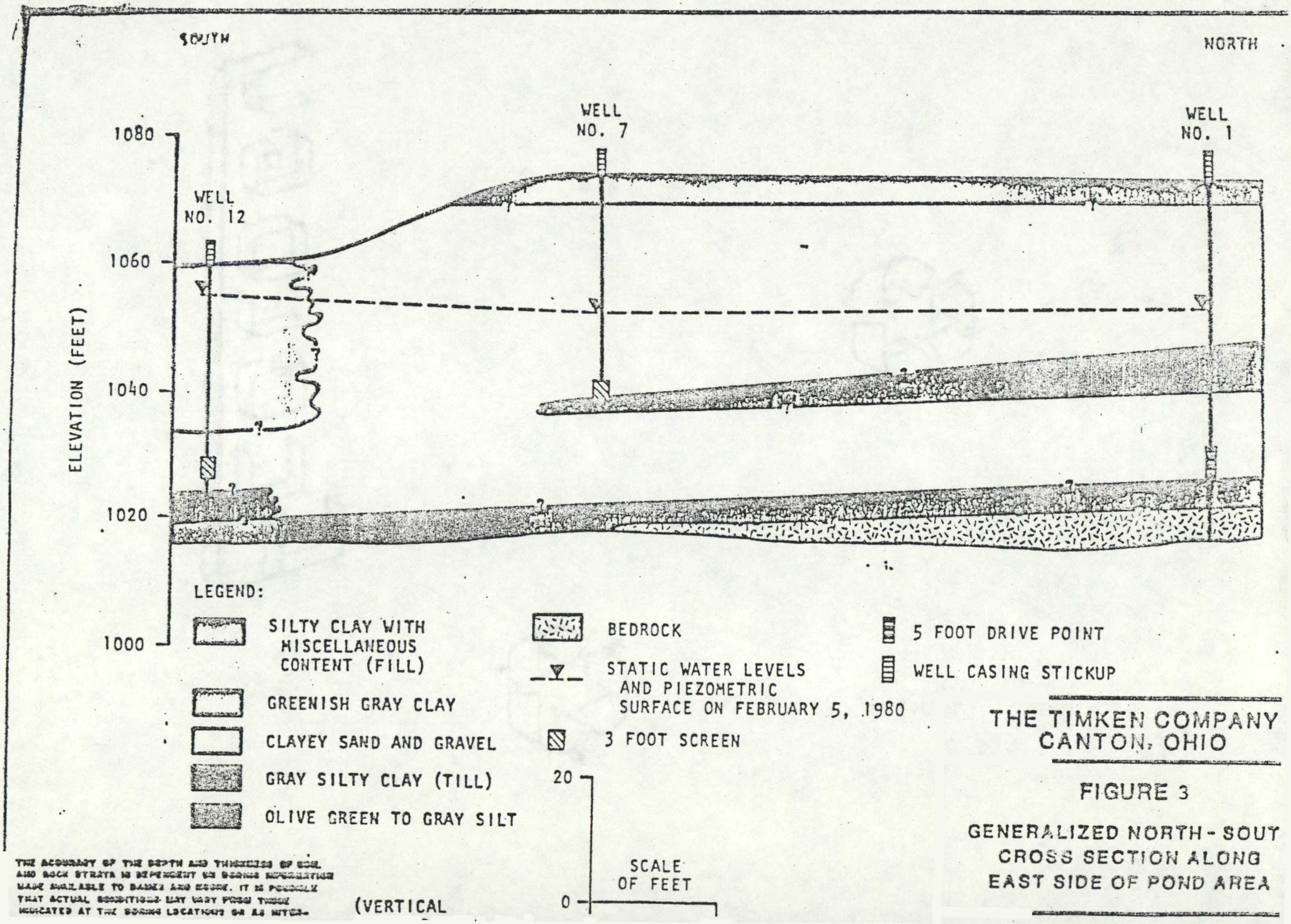

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FIGURE 3

GENERALIZED NORTH - SOUT
CROSS SECTION ALONG
EAST SIDE OF POND AREA

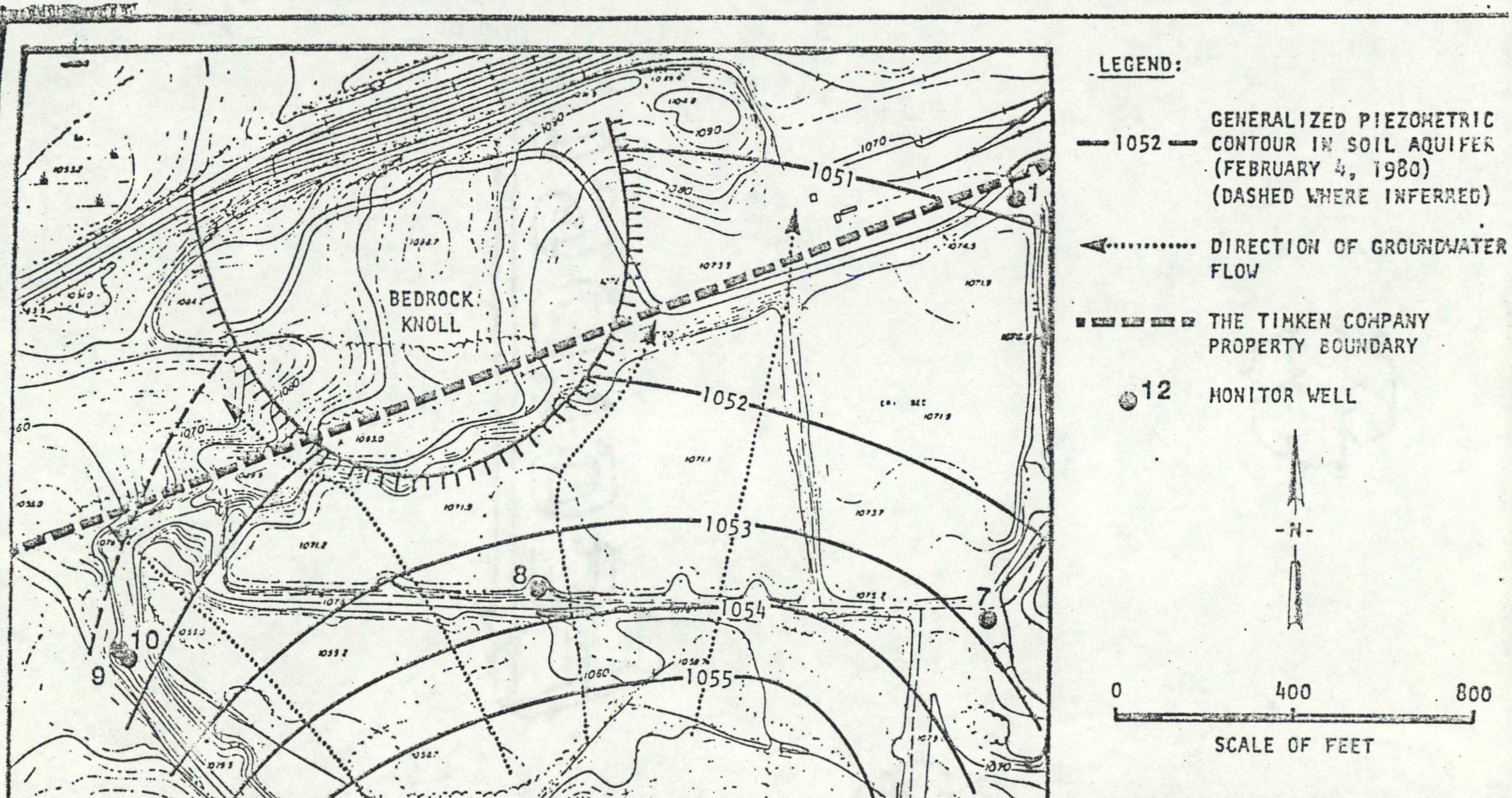

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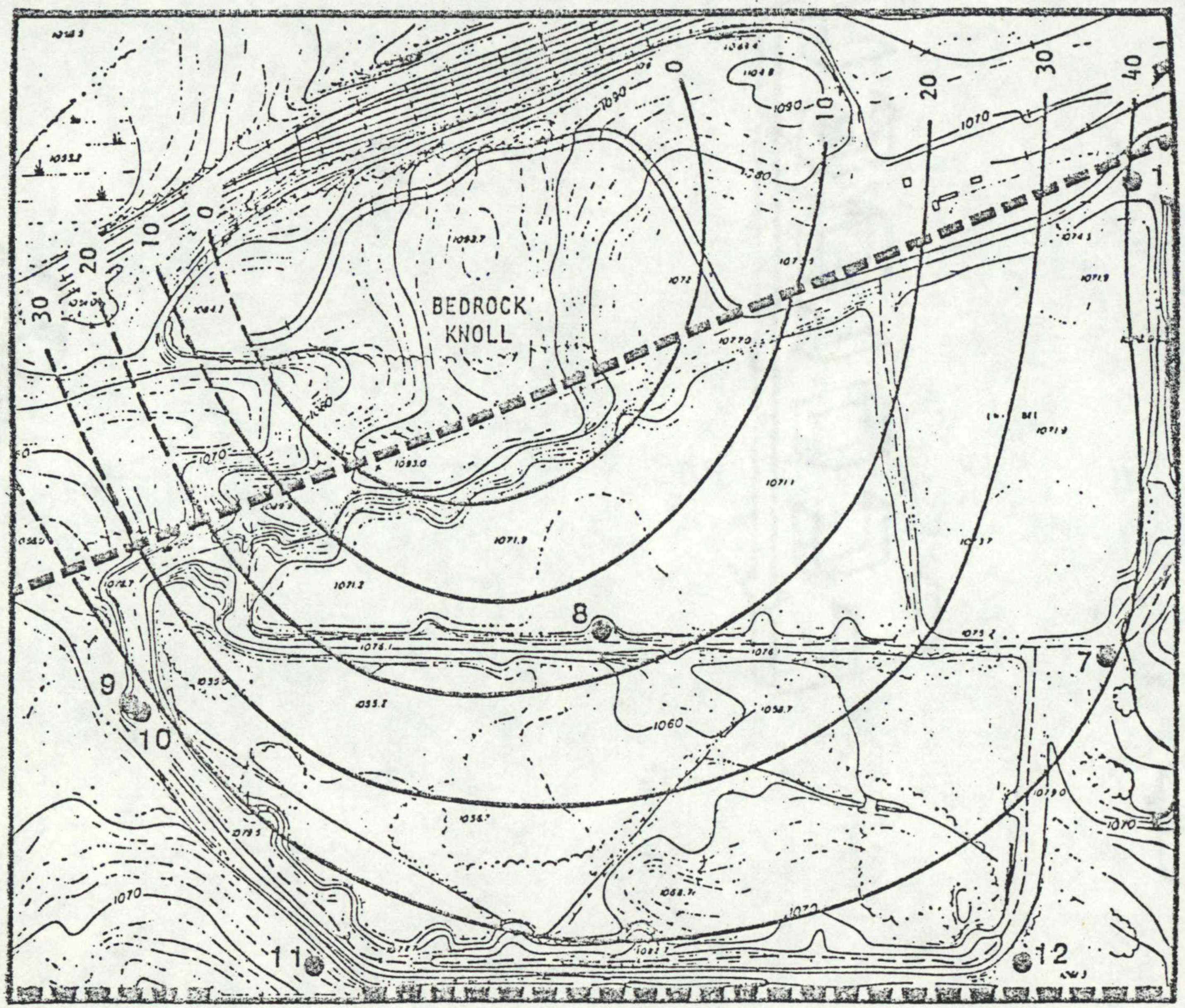
FIGURE 4

GENERALIZED PIEZOMETRIC ELEVATIONS IN THE GLACIAL DRIFT AQUIFER (FEBRUARY 4, 1980)



LEGEND:

— 40 — SATURATED THICKNESS CONTOUR (FEET) BASED UPON DIFFERENCE IN ELEVATION BETWEEN GROUND WATER CONTOURS ON FEBRUARY 4, 1980 AND BEDROCK CONTOURS (DASHED WHERE INFERRED)

▬ ▬ ▬ THE TIMKEN COMPANY PROPERTY BOUNDARY

● 8 MONITOR WELL

-N-

0 400 80

SCALE OF FEET

THE TIMKEN COMPANY
CANTON, OHIO

FIGURE 5

APPROXIMATE SATURATED THICKNESS OF THE GLACIAL DRIFT AQUIFER

TABLE 1

AQUIFER COEFFICIENTS OF MONITORING WELLS

Well Number	Approximate Pumping Rate (gpm)	Transmissivity[a] (gpd/ft)	Permeability[b] (ft/day)
7	10	-	
8	10	2,640	117
9	8.5	1,730	77
10	7	50	2.2
11	12	2,880	128
12	11	100	4.5

Determination of Transmissivity[a] (T):

$$T = \frac{264\ Q}{s} = \text{gpd/ft}$$

where

Q = pumping rate in gpm
s = drawdown difference per log cycle, in feet

Determination of Permeability[b] (K)

$$K = \frac{\frac{\text{transmissivity}}{\text{screen length}}}{7.46\ \text{cf/gal}} = \text{ft/day}$$

[a]Modified Jacob Time-Drawdown Method of analysis, given in Walton, W.C., 1962. Selected analytical methods for well and aquifer evaluation. Illinois State Water Survey, Bulletin 49, p. 9.

[b]Logan, J., 1964. Estimating transmissivity from routine production tests of water wells. Ground Water, Vol. 2, No. 1, pp. 35-37.

TABLE 2

GROUND WATER LEVELS IN MONITORING WELLS

Well Number	1		7		8		9		10		11		12	
Date	Depth to Water	Water Elevation	Depth to Water	Water Elevation	Depth to Water	Water Elevation	Depth to Water	Water Elevation	Depth to Water	Water Elevation	Depth of Water	Water Elevation	Depth to Water	Water Elevation
Elevation of reference[a]		1,075.98[b]		1,078.12[c]		1,076.06[c]		1,080.30[c]		1,079.79[c]		1,064.25[c]		1,063.19[c]
1/ 8/80	25.35	1,050.63												
1/ 9/80	25.43	1,050.55												
1/15/80	24.92	1,051.06												
1/16/80	24.87	1,051.11												
1/17/80	24.80	1,051.18	24.83	1,053.29										
1/18/80	24.73	1,051.25	24.75	1,053.37	21.24	1,054.82								
1/21/80	24.65	1,051.33	24.72	1,053.40	21.32	1,054.74								
1/22/80	24.56	1,051.42	24.70	1,053.42	21.41	1,054.65								
1/23/80	24.73	1,051.25	24.85	1,053.27	21.38	1,054.68								
1/24/80	24.66	1,051.32	24.52	1,053.60	21.35	1,054.71	35.95	1,044.35						
1/25/80	24.60	1,051.38	24.22	1,053.90	21.40	1,054.66	35.45	1,044.85						
1/29/80	24.73	1,051.25	24.73	1,053.39	21.68	1,054.38	35.48	1,044.82	28.05	1,051.74				
1/30/80	24.77	1,051.21	25.49	1,052.63	21.81	1,054.25	35.47	1,044.83	28.10	1,051.69	8.47	1,055.78		
2/ 4/80	24.90	1,051.08	25.67	1,052.45	22.62	1,053.44	35.72	1,044.58	28.48	1,051.31	8.68	1,055.57	8.22	1,054.97
2/ 5/80	25.00	1,050.98	25.72	1,052.40	22.64	1,053.42	35.65	1,044.65	28.40	1,051.39	9.23	1,055.02	8.22	1,054.97
2/ 6/80	25.03	1,050.95	25.97	1,052.15	23.55	1,052.51	35.71	1,044.59	29.57	1,050.22	9.70	1,054.55	8.30	1,054.89

[a]Elevation reference is mean sea level.

[b]From top of 1-1/4-inch casing.

[c]From top of well cap.

TABLE 3

CHEMICAL ANALYSES OF
NEUTRALIZED PICKLE LIQUOR,
SLURRY DISCHARGE INTO POND 3

Sampling date	Raw Slurry 1/7/80	Raw Slurry 2/5/80	Raw Slurry 1/20/81	Decant 1/20/81
pH (standard units)	8.76	12.02	9.68	9.12
Chloride*	88††	683	159	149
Sulfate*	1,800	42,500	1,725	1,550
T. dissolved solids*	2,200	6,028	3,600	3,202
T. suspended solids*	131,000	153,000	55,600	120
Total hardness (as $CaCO_3$)*	1,639††	55,244	1,309	1,583
Fluoride*	6.95	11.0	6.00	0.92
Nitrate*	3.30	1.0	0.03	0.13
Carbonate*	1,594	25,826	624	13.2
Bicarbonate*	12,943	23,714	14,592	53.0
Sodium*	112	340	220	200
Potassium*	15.9	24.4	12.0	9.98
Magnesium*	376	370	530	20.1
Calcium*	6,720	8,620	8,810	705
Iron*	8,960	7,468	5,430	21.8
Manganese*	54.0	59.2	47.8	0.15
MBAS†	80	80	80	80
Arsenic†	332	20.0	230	<2.5
Barium†	300	148	188	34
Cadmium†	4	21	11	<1.0
Chromium, hexavalent†	10	50	<1.0	<1.0
Chromium, total†	–	–	41,700	179
Cyanide†	109	<2	<2	<2
Copper†	3,120	764	1,800	44
Lead†	80	64	105	10
Mercury†	<0.4	<0.1	<1.0	<0.1
Nickel†	60,800	60,400	77,600	1,150
Selenium†	<7.2	<2.0	<25	<2.5
Silver†	<1	<4	<2.0	4.0
Vanadium†	700	112	681	43
Zinc†	11,300	4,860	18,100	214
% Total solids	12.96	16.00	5.90	0.33

*Parameters expressed in milligrams per liter.
†Parameters expressed in micrograms per liter.
†† = filtrate

TABLE 4

CHEMICAL ANALYSES OF SLUDGE SAMPLES
METALLIC AND NONMETALLIC COMPONENTS

Sample Designation	POND 1 A		POND 2 B		POND 3 C	D	E	F	Mean Value	Maximum Allowable Level For Extract
Depth from surface	0'10"-2-1/2'	2-1/2'-5'	1' - 3'	3' - 5'	1-1/2'-5'	2.5' - 5'	6"-2-1/2'	1' - 4'		
Sampling date	1/7/80	1/7/80	1/7/80	1/7/80	1/7/80	1/7/80	1/7/80	2/6/80		
Analyses of sludge										
Wet density (g/cc)	1.408	1.408	1.444	1.378	1.296	1.291	1.231	1.369	1.353	
% moisture	58.86	58.02	55.97	61.20	65.23	65.42	73.48	63.58	62.72	
Paste pH	6.70	6.50	6.70	8.50	8.75	9.15	11.60	9.28	8.39	
Analyses of extract[b]										
pH (standard units)	6.80	6.20	6.39	5.97	5.37	5.23	5.10	4.88	5.74	
Chloride*	1	2	2	3	21	22	36	16	13	
Sulfate*	1,000	1,010	1,100	1,140	1,200	1,310	1,490	1,575	1,228	
Fluoride*	0.343	0.183	0.168	0.160	0.082	0.151	0.039	0.170	0.162	140-240
Nitrate*	0.23	0.35	0.35	0.32	0.37	0.34	0.47	0.955	0.423	1000
Carbonate*	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Bicarbonate*	295	353	446	1,282	1,587	1,278	1,715	1,773	1,091	
Sodium*	0.655	1.13	1.16	1.53	269	164	219	9.53	83.25	
Potassium*	0.056	0.188	0.364	0.300	0.982	0.958	0.983	0.76	0.574	
Magnesium*	2.99	3.08	21.6	127	11.4	54.4	51.6	86	44.76	
Calcium*	617	600	596	790	840	796	918	943	762	
Iron*	0.500	0.30	1.26	0.123	19.4	22.6	210.0	624.5	109.835	
Manganese*	0.350	1.45	4.90	4.4	8.40	7.6	8.2	12.5	5.975	
Nickel*	0.024	0.97	1.02	0.875	5.28	5.4	11.2	12.55	4.665	
Arsenic†	<3	<3	<3	<3	<3	<3	<3	<3	<3	5,000
Barium†	120	100	75	75	400	400	400	36	201	100,000
Cadmium†	<1	<1	<1	<1	<1	<1	<1	2	<1	1,000
Chromium, hexavalent†	<1	<1	<1	<1	<1	<1	<1	14	2	5,000
Copper†	<1	<1	<1	<1	29	8	5	<1	5	
Cyanide†	<2	<2	<2	<2	<2	<2	<2	8	<2	
Lead†	<1	<1	<1	<1	<1	<1	<1	4	<1	5,000
Mercury†	<0.1	0.9	0.3	0.1	0.4	0.3	0.3	<0.1	0.3	200
Selenium†	<2	<2	<2	<2	<2	<2	<2	<2	<2	1,000
Silver†	<1	<1	<1	<1	<1	<1	<1	<1	<1	5,000
Vanadium†	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Zinc†	47	95	105	62	554	295	1,280	819	407	

[a]Maximum extract level for toxic waste (=100X EPA Primary Drinking Water Standard).

[b]Extraction procedure per Federal Register December 18, 1978 and May 19, 1980.

*Parameters expressed in milligrams per liter.

†Parameters expressed in micrograms for liter.